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With the increase in the size of the embryo, in these large-yolked forms, it is finally thrust down into a saccular involution of the blastoderm, the lips of the opening of which meet over the back of the embryo where they coalesce, the outer limb of the duplicature giving rise eventually to the serous envelope, and the inner to the roof of the amniotic cavity. In those types which have the primary layers apparently inverted, the rapid ingrowth of the suspensor precociously invaginates the germinal area inwards before the embryo is distinctly developed, so that it is not formed in its usual or normal position. These extreme modifications were not possible until after the loss of the food-yolk, after which a hollow blastodermic vesicle still continued to develop, filled with a thin albuminous or serous fluid instead of a dense yolk material. The tendency of the eutherian ovum to form a large, hollow blastodermic vesicle or blastula is doubtless an inheritance transmitted from a paratherian source. The bodily invagination of the whole embryo, and the more or less complete obliteration of the cavity of the umbilical vesicle by the rapid growth of the enlarging amnion, would be readily accomplished in the course of the development of the eutherian ovum.

EXPLANATIONS OF THE REFERENCE LETTERS USED IN THE FIGURES.

a amniotic head-fold, *a'* tail-fold, *ac* amniotic cavity, *al* allantois, *c* cœlomic space or continuation of body cavity, *dr* decidua reflexa of uterus, *E* embryo, *e* epiblast, *f* cavity of false amnion (*falsche amnionhöhle*), *hy* hypoblast, *hy'* hypoblastic outer wall of umbilical vesicle, *m* mesoblast, *ol* outer layer (*Reichert'sche Deckzellen, Deckschicht*), *s* suspensor (*Träger*), *se* serous envelope, *so* muscular somites, *sp* splanchnopleure (= the periblast in Fig. *A*), *st* sinus terminalis, *Y* yolk, with + and — signs to indicate its presence or absence.

—*John A. Ryder.*

DECEMBER 31, 1885.

PHYSIOLOGY.[1]

THE EXISTENCE OF TWO KINDS OF SENSIBILITY TOWARD LIGHT. —MM. Charpentier and Parinaud, working independently, have concluded that visual sensations involve two distinct kinds of physiological processes. Sensations of one kind are "photesthetic" and involve luminous sensations pure and simple, merely discriminating light in distinction to darkness. The other sensations are truly "visual" and are necessary to the perception of color, of form, and to distinctness of vision. The first kind of sensation is supplied by the excitement of the rods of the retina through the chemical disintegration of the "visual purple," which is found in their outer segments. The power of giving rise to the second kind of sensations is confined to the retinal cones which wholly compose the bacillary layer of the fovea centralis, but which relatively decrease in number with reference to the rods as we recede from this area. Parinaud declares that the increase of sensibility of the retina to small differences of luminosity when the amount of objective light is extremely small is confined to the area outside the fovea centralis. This increase of sensibility is proportionately greater toward the more refrangible rays. This fact affects the tone of colors, and on account of it the luminosity of (the more refrangible ?) colors is increased at the expense of their saturation. The reader may be reminded, as an interesting confirmation of this view that, when alternate circles, painted blue and red, are looked at in obscurity, the former appear luminous and the latter black. Visual purple is bleached by light and is regenerated under the influence of the pigmentary layer of the retina in the dark. In these facts we have an explanation of the varied. sensibility toward light of different intensities.—*Comptes Rendus, 1885, p. 821.*

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[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.

THE CIRCULATION IN GANGLION CELLS.—A most curious discovery, if it be confirmed, is that announced by Adamkiewicz concerning the supply of blood to nerve ganglion cells. In his researches on the blood-vessels of the spinal cord, the author found that the richness in capillaries was directly proportional to the number of nerve-cells. His more special investigations of this relation were made on the intervertebral ganglia taken from injected animals. The nerve-cells composing these ganglia are each inclosed in a connective-tissue capsule, lined by flattened cells and having two tubular prolongations from it. The nerve-cell itself is inclosed in a special sac of flattened cells and possesses two prolongations which reach out into those of the surrounding connective-tissue capsule. Between the latter capsule and the cell is a rather roomy space, and there is also a much narrower one between the substance of the cell and its own epithelial covering. The arterial blood enters by an afferent vessel into the pericellular space and leaves it by a much narrower efferent vessel. The blood thus surrounds the cell under pressure and its liquid portions pass actively by osmosis into the substance of the cell itself, in the centre of which they are received by an empty space. This empty space is nothing else than what has so long been regarded as the nucleus of the cell. This space belongs to the venous system with which it is in connection by a minute vessel having its own proper wall. A solid body, hitherto called the nucleolus, is suspended fixed in the centre of the nuclear cavity.—*Comptes Rendus, 1885, p. 826.*

PASTEUR'S METHOD FOR THE PREVENTION OF HYDROPHOBIA.—In the *Comptes Rendus* for October, 1885, is the latest report of Pasteur's experiments upon the prophylaxis of hydrophobia. The following is an outline of his procedure: When a small particle of the spinal cord of a dog dead from rabies (*moelle rabique*) is placed under the dura mater of a rabbit the animal always falls a victim to hydrophobia after a period of incubation which lasts some fifteen days. When virus from the first rabbit is transferred in the same way to a second and, after the period of incubation is passed, that from the second to a third rabbit and so on, the duration of the period of incubation becomes more and more reduced. After the successive inoculation of twenty to twenty-five rabbits, the time of incubation is reduced to some eight days, and the incubation period remains of this length throughout a further series of twenty to twenty-five successive inoculations; then the time of incubation is shortened to seven days, which is maintained with remarkable regularity throughout a new series of ninety inoculations. Pieces of the spinal cords of these rabbits induce hydrophobia with constant virulence. When the diseased cord is detached from a rabbit under the strictest precautions against contamination by impurities, and is suspended in a flask, the air of which is kept dry by caustic potash on the bottom, its virulence gradually disappears and may become wholly lost. The virulence fails somewhat more slowly the larger the piece of marrow exposed, and is preserved longer the lower the temperature. These facts being established, the following procedure proved successful in rendering dogs resistant to the influence of inoculation with the most potent virus. Pieces of spinal marrow from rabbits dead of hydrophobia which had appeared after seven days' incubation, were suspended in a series of flasks the air in which was maintained dry. As stated above, the virulence of each specimen diminished progressively with its exposure. Sterilized bouillon was inoculated with a small portion of cord which had been exposed for such a time that the loss of its virulence was certain, and a small syringe full was injected under the skin of a dog. On each day following a similar operation was performed, using, however, at each injection, spinal cord which had been exposed for a shorter time and which possessed, therefore, progressively increasing virulence. When this procedure had been repeated until the dog had received an injection of virus which had been exposed to dry air only one or two days, the animal was found to be perfectly protected against hydrophobia, and might with impunity be inoculated with the strongest virus. Fifty dogs were thus made resistant to the disease without a single failure, besides which a number were successfully inoculated after having been bitten by rabid animals. A child which had been lacerated by a mad dog two days before and whose wounds had been cauterized with carbolic acid two hours after the injury, was brought to Pasteur for treatment. The method pursued was similar to that described, and the final inoculation was with virus more virulent than that of ordinary rabies. Three months and three weeks after the accident the child was still well. Pasteur explains his results by supposing that the products formed by the vital activity of the germs of the disease are poisonous to the germs themselves. These products are gradually set free by the action of the "attenuated" virus, and accumulate in the body in sufficient quantities to render the development of the strongest virus impossible.